

PM_{2.5} COMPONENTS EXPOSURES AND CARDIAC AUTONOMIC FUNCTION: A PANEL STUDY OF TAXI DRIVERS

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Background and Aims: Carbonaceous and metallic components of particles have been shown to play a role in particles' effects on cardiac autonomic function as measured by heart rate variability (HRV). We previously reported the association of HRV with marked changes in traffic-related particulate air pollution around the Beijing 2008 Olympic Games in a panel of taxi drivers (Wu et al., 2010). We further investigated the relationship between exposures to the carbonaceous and metallic components of traffic-related particles and HRV in the same population.

Methods: Repeated measurements of in-car exposures to particulate matter ≤ 2.5 μm in aerodynamic diameter (PM_{2.5}) and carbon monoxide were conducted in a group of 14 taxi drivers for one work shift in four study periods around the Beijing 2008 Olympics. The quantities of organic/elemental carbons and 27 elements of the traffic-related PM_{2.5} mass were determined laboratorially. Linear mixed-effects models were used to evaluate the impact of exposures to different PM_{2.5} components on HRV while controlling for potential confounders.

Results: Taxi drivers' exposures to traffic-related PM_{2.5} components showed dramatic changes across the four study periods around the Beijing 2008 Olympics. Differences in associations of traffic-related PM_{2.5} components with HRV were found. An interquartile range (IQR: 917.9 ng/m³) increase in calcium was associated with a 5.48 milliseconds [95% confidence interval (CI): 0.71, 10.24] increase in standard deviations of normal-to-normal (SDNN) intervals, whereas an IQR (4.1 ng/m³) increase in nickel was associated with a 1.53 milliseconds (95% CI: 0.14, 2.92) increase in SDNN index. Additionally, a decline of 8.11 milliseconds (95% CI: -15.26, -0.97) in SDNN per IQR (481.4 ng/m³) increase in iron was also found.

Conclusions: Our results support associations of PM_{2.5} metallic components with cardiac autonomic function in the study population. Future studies are needed to clarify the interaction among different PM_{2.5} components or the role of PM_{2.5} mixtures.

References: Wu S, Deng F, Niu J, Huang Q, Liu Y, and Guo X. Association of Heart Rate Variability in Taxi Drivers with Marked Changes in Particulate Air Pollution in Beijing in 2008. *Environ Health Perspect* 2010;118:87-91.

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